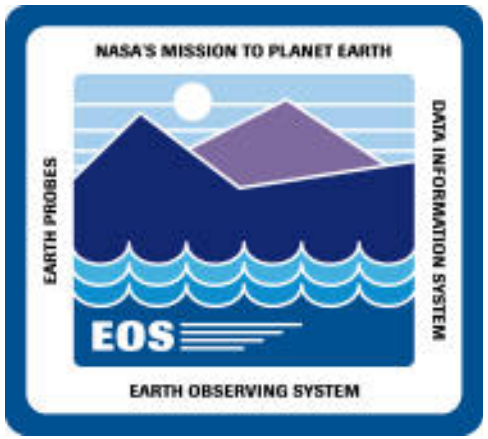


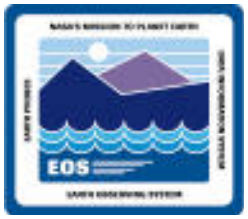
DMG Hardware Design

Richard D. Hunter

rhunter@eos.hitc.com

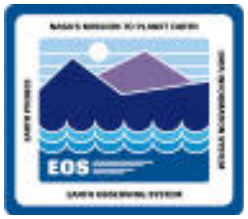
19 April 1996

Overview



- Design Drivers
- Sizing Analysis
- Configuration
- RMA Analysis
- Capacity Breakpoints
- Failover Analysis

Design Drivers



- **DMG hardware will accommodate Interoperability and Data Management software CIs**
- **EOSD3930 - RMA requirement: Ao $\geq$ .993 MDT < 2.0 hrs.**
- **IMS-1800 - 100% Growth in Capacity (expansion in processing and storage without major changes to the hardware design)**
- **User Characterization analysis of science and non-science user search invocations**
- **DBMS transaction rate analysis for Interoperability and Data Management software CIs**

DMG H/W CI CPU & RAM Sizing

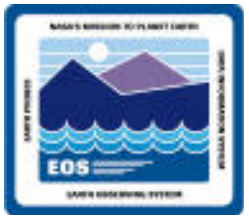
- DBMS transaction rate analysis is the primary driver for CPU capacity sizing
- DBMS transaction rate analysis is based on assumptions regarding the amount of processing associated with the different types of search requests that pertain to Interoperability and Data Management Software CIs
- DBMS transaction rate assumptions per search request type were made based on search complexity (one site vs. multi-site) and preliminary LIMGR CI prototype results
- RAM sizing based on vendor (HP) recommendation - 512 MB in support of a 2 CPU configuration

GSFC DBMS Transaction Rate Analysis

DAAC	User Type	Service	Searches/hour	Transactions/ hour	TPM
GSFC	Science	Gateway	105	766	13
GSFC	Science	Advertising	26	130	2
GSFC	Science	Data Dictionary	26	130	3
GSFC	Science	LIMGR	210	1532	26
GSFC	Science	DIMGR	210	1532	26
GSFC	Non-Science	Gateway	324	3805	63
GSFC	Non-Science	Advertising	1994	9970	166
GSFC	Non-Science	Data Dictionary	1994	9970	166
GSFC	Non-Science	LIMGR	648	7610	127
GSFC	Non-Science	DIMGR	648	7610	127
Totals:			6193	43055	719

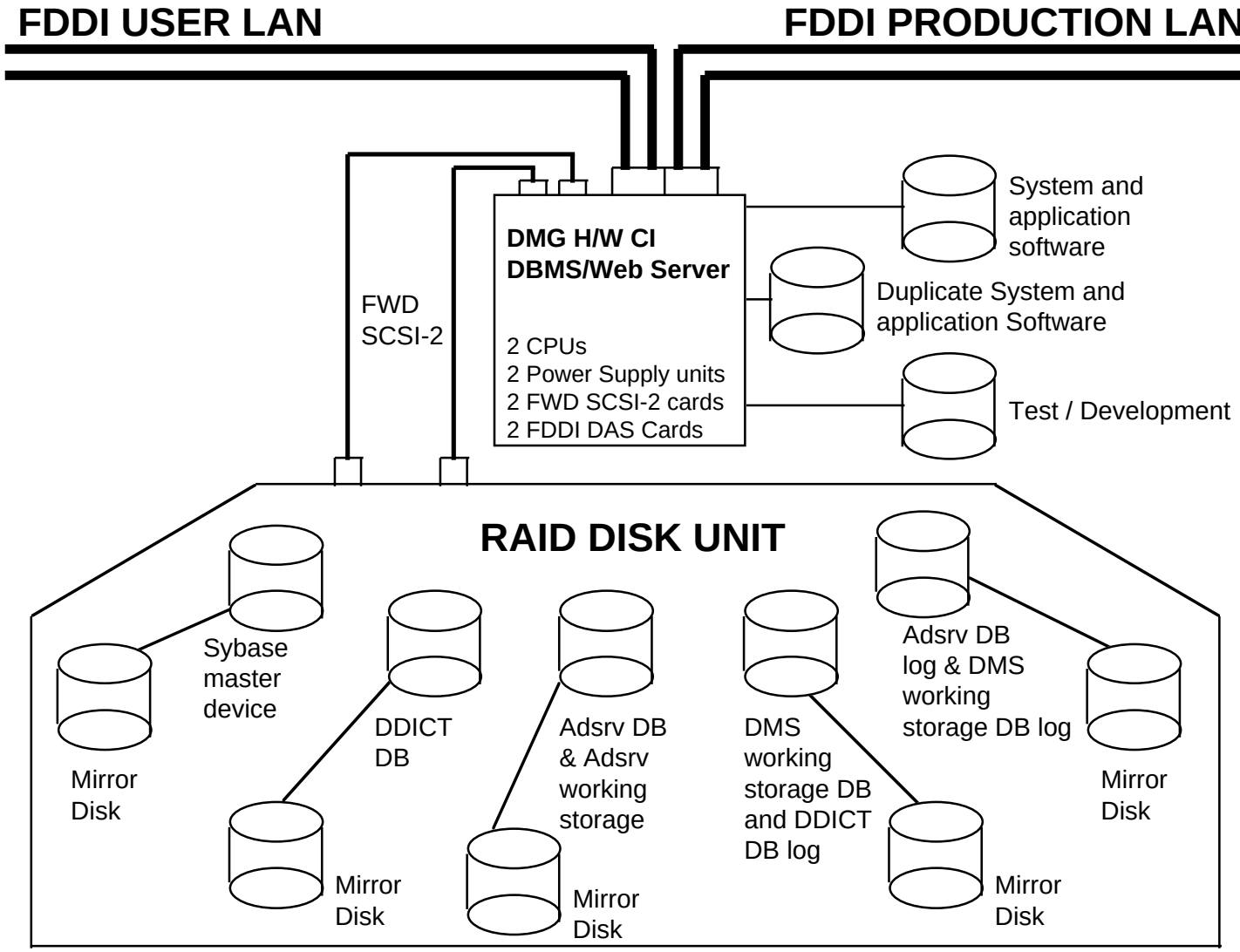
- **DBMS transaction rate analysis depicts peak number of transactions**
- **HP PA7200 CPU rated at 1000 Transactions Per Minute (TPM)**

GSFC DMG H/W CI Server Configuration

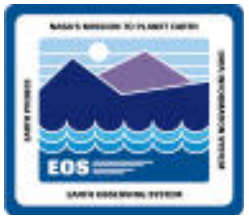


- 1 HP K400
- 2 PA 7200 CPUs (1 CPU rated at 1000 TPM, 2nd CPU supports RMA)
- 2 Operating System Disks (internal)
- 1 Test/Development Disk (internal)
- 2 FWD SCSI-2 I/O cards
- 2 FDDI DAS I/O cards
- 2 Power Supply Units
- 512MB RAM
- 1 Model 20 RAID Storage Unit (21GB)

GSFC DMG H/W CI Server Configuration



DMG H/W CI Server Storage Analysis Drivers

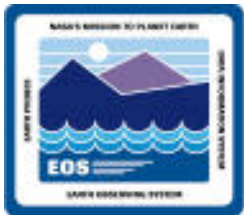


- Vendor supplied inputs for sizing COTS software
- Development team supplied sizing inputs for Interoperability and Data Management software CIs and utilities
- Development team supplied sizing inputs for databases (derived from estimates for collection specific attributes, core attribute definitions and GCMD collections)

DMG H/W CI Storage Analysis

S/W Component	Release B Capacity
COTS Software:	
Sybase System	300 MB
HTTP Server	10 MB
	Total: 310 MB
Databases:	
Sybase Master Database	3 MB
Sybase Tempdb Database	100 MB
Sybase Model Database	2 MB
Advertising Database	150 MB (Estimate)
Advertising DB Workspace	150 MB (Estimate)
Advertising DB Log	100 MB (Estimate)
Advertising HTML Files	100 MB (Estimate)
Data Dictionary Database	400 MB (Estimate)
Data Dictionary DB log	100 MB (Estimate)
DMS Working Store Database	500 MB (Estimate)
DMS Working Store DB log	100 MB (Estimate)
	Total: 1705 MB
Operating System & Utilities:	
Operating System Software	700 MB
Utilities	200 MB (Estimate)
DCE Client	46 MB
	Total: 946 MB
	Total: 2961 MB

RAID Unit Configuration



- Mirror disks account for 10.5GB of the total disk space (21GB)
- Interoperability and Data Management software CIs are distributed across multiple partitions in order to optimize I/O (recommended by vendor and development team)
- Disk capacities for single units (10 total) are dependent on vendor specifications (smallest available capacity = 2.1GB per unit)
- RAID level 1 configuration
- Redundant FWD SCSI-2 controllers
- Redundant power supply units

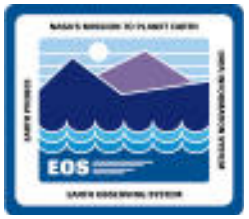
DMG H/W CI Server RMA

- **EOSD3930 RMA requirement: Ao ≥ .993, MDT < 2 hrs.**

- **MTBF = 22,747 hrs. - calculated for DMG H/W CI server by the Reliability Engineering Group**

- **All pertinent functional RMA requirements have been met (see 515-CD-002-002 for details)**

GSFC DMG H/W CI Workstation Configuration



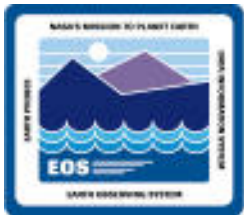
Component	Class/Type	Platform	Qty.	Number of Processors	Memory	Disk Capacity
DBA Workstation	Uniprocessor	HP 715	1	1	64 MB	6 GB
Data Specialist and User Support Workstations	Uniprocessor	SUN SPARC 20/50	5	1 (each)	64 MB (each)	6 GB (each)

- **DBMS administration workstation will support database management and development activities**
- **Data Specialist and User support workstations will support the user community**

GSFC DMG H/W CI Server CPU Capacity Breakpoints

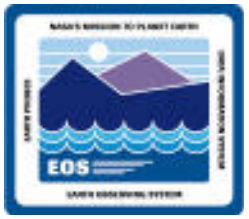
- CPU can sustain a load of 1.4X before an additional CPU would need to be added
  - Additional 39 science user and 2150 non-science user accesses per day
  - Additional 404 science user accesses (alone)
  - Based on DBMS transaction rate analysis (peak)
- Server could sustain a load of 3.5X by using up to 3 CPUs (4th CPU dedicated for RMA) before upgrading to PA8000 CPU
- PA8000 CPU preliminary rating = 75% higher processing capacity than current PA7200 (server could sustain a load of 6X)

Storage Capacity Breakpoints



- **Data Dictionary CI, Advertising Service CI and DMS Working Store (DIMGR CI, LIMGR CI, Gateway CI) can grow to 5X initial capacity (individually) before impacting storage capacity**
- **Worst case - DMS Working Store and Data Dictionary CI are able to grow to 4X initial capacity (together) before impacting storage capacity**
- **Options for growth:**
  - **Add 10 additional 2.1GB disk drives and implement RAID level 0/1, worst case - DMS Working Store and DDICT CI are able to grow to 7X initial capacity (together)**
  - **Replace 2.1GB drives with 4.2GB drives and implement RAID level 0/1, worst case - DMS Working Store and DDICT CI are able to grow to 15X initial capacity (together)**
  - **Replace 4.2GB drives with 9GB drives and implement RAID level 0/1, worst case - DMS Working Store and DDICT CI are able to grow to 31X initial capacity (together)**

DMG H/W CI Server Failover Analysis



- Failover Capability for the following components is provided for in the design: 1) operating system disk, 2) CPU, 3) FWD SCSI-2 I/O card, 4) FDDI I/O card, 5) power supply unit
- RAID unit provides failover capability for critical Interoperability and Data Management applications using mirror disk technology
- The hardware design provides continued availability in the case of failure to a single component per critical function